Appendix H-B

T Plant Complex, 277-T Building Dangerous Waste Management Unit Closure Plan

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H-B1 Introduction

This appendix discusses closure activities for the T Plant Complex Operating Unit Group (OUG) (T Plant Complex) 277-T Building dangerous waste management unit (DWMU), hereinafter referred to as the 277-T Building. The Permittee[BD1]s[LS(2][BD3] (the U.S. Department of Energy (DOE) and CH2M Hill Plateau Remediation Company (CHPRC)~~has~~ concluded that the 277-T Building will no longer be utilized for future receipts of dangerous, mixed, or *Toxic Substances Control Act of 1976* (TSCA)-polychlorinated biphenyl (PCB) waste and has determined ~~with the U.S. Department of Energy (DOE) and CH2M Hill Plateau Remediation Company (CHPRC)~~ to close this unit. The closure will be performed in accordance with the schedule provided in Section H-B4.

This closure plan complies with WAC 173-303-610(2) through WAC 173-303-610(6), "Dangerous Waste Regulations," "Closure and Post-Closure," and represents the baseline for closure and the enforceable compliance requirements for conducting closure. Amendments to this closure plan will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

H-B1.1 Unit Description

The 277-T Building (Figures H-B-1 and H-B-2) is a single story, pre-engineered, steel structure constructed of I-beams covered with corrugated steel on a concrete slab on grade foundation. The building is approximately 10 m (32 ft) wide, by 12 m (40 ft) long, by 7 m (24 ft) high. Rollup doors are located on each end for loading and unloading operations.

The 277-T building contains one sump (Figure H-B-3) on the north side of the building approximately 3 m (10 ft) long by 0.6 m (2 ft) wide that historically provided the collection and drainage of water from condensate blowdown lines. The condensate blowdown lines inside the building have been removed. The sump contains a 4 in. diameter cast iron pipe that connects to an 8 in. diameter, vitrified clay pipe. (The sump was used as a temporary sump.) The 8 in. diameter clay pipe carried the condensate from the 277-T Building sump to the 216-T-1 drainage ditch located north of the 277-T Building. The drainage ditch was backfilled and stabilized in 1995 and the discharge pipes have been cut and isolated. The drainage ditch and pipelines are currently WIDS sites and being tracked in the WIDS database so will not be covered under this closure plan. [BD4][LS(5][BD6]Therefore, the surface of the sump floor, the surface of the building floor, and the interior building walls will be designated as the boundary of the 277-T Building DWMU. [BD7][LS(8]

The 277-T Building currently serves as equipment and material storage to support T Plant operations. [BD9][LS(10][BD11]The 277-T Building does not currently store dangerous, mixed, or TSCA-PCB waste. Dangerous waste container storage and treatment of dangerous, mixed, or TSCA-PCB waste within the 277-T Building will not be requested after *Resource Conservation and Recovery Act of 1976* (RCRA) closure is complete.

H-B1.1.1 Maximum Waste Inventory

The maximum inventory of dangerous, mixed, or TSCA-PCB waste stored in the 277-T Building over its lifetime included one container of mixed, TSCA-PCB waste with a total volume of 27 m^3 (36 yd^3). The waste generated from canyon cleanout and included metal and organic material was introduced into the 277-T Building in December 2002 where it was overpacked and stored until September 2003. Details on the dangerous, mixed, and TSCA-PCB waste container are presented in Section H-B3.3 of this closure plan.

Figure H-B-1. T Plant 277-T Building Exterior (February 2013)

Figure H-B-2. T Plant 277-T Building Interior (October 2013)

Figure H-B-3. T Plant 277-T Building Sump Interior (June 2015)

H-B2 Closure Performance Standards

Closure performance standards for the 277-T Building will be based on WAC 173-303-610(2), which requires closure of the facility in a manner that accomplishes the following objectives:

- Minimizes the need for further maintenance;
- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

These performance standards are addressed in Sections H-B2.1 and H-B3.12 of this closure plan.

H-B2.1 Clean Closure Levels

The 277-T Building will be clean closed. The concrete flooring will be sampled and must meet clean-closure levels. In accordance with WAC 173-303-610(2)(b)(i), the clean-closure level for the concrete are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to WAC 173-340, “Model Toxics Control Act—Cleanup,” hereinafter called MTCA, cleanup regulations

(WAC 173-340-700, "Overview of Cleanup Standards," through WAC 173-340-760, "Sediment Cleanup Standards," excluding WAC 173-340-745, "Soil Cleanup Standards for Industrial Properties"). These numeric cleanup levels have been calculated according to the requirements of WAC 173-303-610(2)(b)(i) and -610(2)(b)(ii).[BD12][LS(13][BD14] WAC 173-303-610(2)(b)(ii) is being implemented through the use of the MTCA B closure performance standard for soil as of the effective date of the permit modification. These cleanup levels consider carcinogens, noncarcinogens, groundwater protection, and ecological indicator values. Due to the quantity and nature of the waste stored in the 277-T Building (Section H-B1.1.1) not presenting a threat to groundwater, and not having soil or the presence of plants within the building, no groundwater or ecological indicator cleanup standards are addressed.

A null hypothesis is generally assumed true until evidence indicates otherwise. The null hypothesis, as defined in WAC 173-340-200, "Definitions," for 277-T Building is that the concrete is assumed to be above unrestricted use cleanup levels, commonly called MTCA (WAC 173-340) Method B cleanup levels. Therefore, the site is presumed to be contaminated. Rejection of the null hypothesis means sampling and analysis results of the site indicated that the concrete contains contamination below the MTCA (WAC 173-340) Method B cleanup levels. Sampling and analysis will be used to determine whether the null hypothesis can be rejected, thereby confirming that the concrete meets closure performance standards (MTCA [WAC 173-340] Method B).

Should sampling and analysis provide a basis that the null hypothesis can be accepted, such an event will be considered an unexpected event during closure, and the concrete would then be identified as a newly generated waste stream and managed in accordance with Section H-B3.8.

H-B3 Closure Activities

As a storage unit, clean-closure determination for the 277-T Building will be based on review of the operational history, operating records (including any releases), ~~and~~ a visual inspection of the area to verify that waste-related staining is not present, and sampling/analysis to demonstrate clean-closure performance standards are met. Based on the three types of~~s~~e reviews, the 277-T Building is a candidate for clean-closure under RCRA, and confirmation sampling will be performed. Sampling and analysis activities were developed utilizing the results of the records review and visual inspection, EPA/240/R-02/005, *Guidance on Choosing a Sampling Design for Environmental Data Collection* [EPA QA/G-5S], and Ecology Publication 94-111, *Guidance for Clean Closure of Dangerous Waste Units and Facilities*, and will be conducted via a sampling and analysis plan (SAP) (Section H-B3.10.1). The objective of the sampling described in this document is to determine if the MTCA (WAC 173-340) Method B closure performance standards were met, demonstrating clean-closure of the 277-T Building.[BD15][LS(16]

The following closure activities are required to achieve and verify clean-closure for concrete:

- Remove all dangerous, mixed, and TSCA-PCB LLW waste inventory (completed; see Section H-B3.2).
- Review waste container storage, operating, and inspection records (completed; see Section H-B3.3).
- Perform visual inspections of the concrete flooring to identify additional focused sampling locations including low points, staining, and cracks. (see Section H-B3.3).
- Remove all materials and equipment from within the 277-T Building to support the sampling activities.
- Perform additional visual inspection of areas that could not be inspected previously.

- Perform concrete sampling and analysis to confirm that clean-closure standards are met.
- If detected during initial sampling efforts, decontaminate the concrete as necessary.
- Resample, as necessary, to confirm that MTCA (WAC 173-340) Method B clean-closure levels have been met.
- Transmit closure certification to the Washington State Department of Ecology (Ecology).

H-B3.1 Health and Safety Requirements

Closure will be performed in a manner to ensure the safety of personnel and the surrounding environment. Qualified personnel will perform any necessary closure activities in compliance with established safety and environmental procedures.[BD17][LS(18)][BD19] Personnel will be equipped with appropriate personal protective equipment. Qualified personnel will be trained in applicable safety and environmental procedures and have appropriate training and experience in sampling activities. Field operations will be performed in accordance with applicable health and safety requirements.[BD20][LS(21)][BD22]

The Permittees have instituted training or qualification programs to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. The Hanford Facility RCRA Permit, Attachment 5, describes specific requirements for the Hanford Facility Personnel Training program. The Permittees will comply with the training matrix shown in Table H-B-1, which provides training requirements for Hanford Facility personnel associated with 277-T Building.

Project-specific safety training addressed explicitly to the project and the day's activity will include the following:

- Training will provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with quality assurance requirements.
- Samplers are required to be qualified in the type of sampling being performed in the field.

Table H-B-1. Training Matrix for 277-T Building DWMU

	Training Category[a]				
Permit Attachment 5 Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training	
SWOC Closure Unit DWTP Implementing Plan	Orientation Program	Emergency Response (Contingency Plan)	Emergency Coordinator Training	General Waste Management and Closure Support	Container Management
Job Title/Position					
Non-Facility Personnel	X				
NCO	X	X		~~X~~[a] X[b]	X[b]

Table H-B-1. Training Matrix for 277-T Building DWMU

	Training Category[a]				
Operations Supervisor	X	X	X	X[b]	
ECO	X			X[b]	
Waste Service Provider	X			X[b]	X[b]
Sampler	X			X[b][BD23][LS(24][BD25]	

a. Refer to the T Plant Complex DWTP for a complete description of coursework in each training category.

b. Training received is commensurate with the duties performed. Individuals in this category who do not perform these duties are not required to receive this training.

DWMU = dangerous waste management unit
DWTP = dangerous waste training plan
ECO = environmental compliance officer
NCO = nuclear chemical operator
SWOC = Solid Waste Operations Complex

Pre-job briefings will be performed to evaluate activities and associated hazards by considering the following factors:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work
- Level of management control
- Emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittees training organization maintains the training records system.

H-B3.2 Removal of Wastes and Waste Residues

No dangerous, mixed, or TSCA-PCB waste is currently stored at the 277-T Building. The last mixed, TSCA-PCB waste was removed in September 2003.[BD26][LS(27][BD28] 277-T Building will no longer be used for dangerous, mixed, or TSCA-PCB waste storage. The 277-T Building will be ~~maintained~~ closed in accordance with WAC 173-303-610[BD29][LS(30][BD31] in a manner that demonstrates that all steps have been taken and will continue to be taken to prevent threats to human health and the environment from the unclosed but not operating DWMU, including compliance with all applicable permit requirements. Inspection requirements during the closure period are identified in Section H-B3.5.

Dangerous waste or waste residues are not anticipated at this unit. There are no waste containers and the operating records review (Section H-B3.3) did not identify any spills or leaks of dangerous waste. Any unanticipated waste or waste residues would be in the form of contaminated concrete and will be managed as newly generated waste and managed in accordance with Section H-B3.8.

H-B3.3 277-T Building Records Review and Visual Inspection

To support development of this closure plan and the SAP, the T Plant Complex OUG operating records were reviewed (Table H-B-2). The initial records review completed in July 2013 included the following RCRA operating record documents: facility operating logbooks (including spill reports) and weekly inspections. The RCRA operating record documents ~~that were reviewed~~ focused on the time frame during active mixed or TSCA-PCB LLW storage for the T Plant closure units including 271-T Cage, 211-T Pad, 221-T Sand Filter Pad, 277-T Outdoor Storage Area, and 221-T R5 Waste Storage Area. The records review extended past the active waste storage period to June 2013. ~~The records review documents included the time period from October 1985 through July 2010. The records review, completed on July 31, 2013, indicated no documented releases of mixed or TSCA-PCB waste within the 277-T Building.~~In October 2013, an additional records review was completed which focused on items of concern related to additional T Plant closing DWMUs including; 221-T Railroad Cut, 277-T Building, 221-T Pipe Gallery Storage, 221-T Tank System, and 2706-TB Tanks System, identified during the initial records review. The records in Table H-B-2 that would have identified concerns for the 277-T Building include the T Plant Daily Operating Log Book (Line 1), the T Plant Daily Waste Management Area Inspection Data Sheet and the Weekly Waste Area Surveillance (Line 6), and the Waste Management Area Daily Inspection Report and the Weekly Waste Area Surveillance (Line 7). The records review, completed on October 2013, indicated no documented releases of mixed or TSCA-PCB waste within the 277-T Building.

Waste management records for the MLLW and TSCA-PCB LLW container stored in 277-T Building were reviewed (Table H-B-3) to determine the target analytes to be included in the closure plan SAP (Section H-B3.10.1). The target analytes are identified in Table H-B-4.

A visual inspection was performed on September 18, 2013 to identify any dangerous waste-related staining in the 277-T Building. No waste-related staining was identified during the visual inspection~~; therefore, only confirmation sampling and analysis to verify clean closure will be performed~~.

On June 15, 2015 an additional visual inspection was performed to identify areas for focused sampling such as low point, cracks, sumps, crevices, and drains. During this walkdown, there were six areas identified for focused sampling. These additional focused sampling locations include three low points, two seams, and one sump sample. The focused samples have been identified and marked in Figure H-B-4. Once all equipment and materials have been removed to support the sampling activities an additional visual inspection will be performed.~~, if~~ If additional areas are identified that require focused sampling, these areas will be sampled in accordance with the sampling requirements in the SAP and documented in accordance with Section H-B3.10.12. The documentation of the additional samples and the sample results will be included in the certification of clean closure (Section H-B3.12).

Based on the operating record review, waste management records, and visual inspections, only confirmation sampling and analysis to verify clean closure will be performed.

Supporting documentation for the RCRA operating records review and visual inspections are documented in Attachment H-B.a and include the T Plant Complex 277-T Building Storage Area visual inspection and the T Plant Dangerous Waste Inspection Checklist and Operations Logbook Review.

Table H-B-2. Operating Records Review Summary

Line	Document Title	Document Type	Start Date	End Date	Items of Concern Noted
1	T Plant Daily Operating Logbook	Logbook	01/02/1985	06/22/2010	No
2	T Plant Operation Logbook	Logbook	07/27/2010	04/07/2011	No
3	Waste Management Area Daily Inspection Data Sheet	Daily Inspection	08/29/2005	12/01/2005	No
4	Waste Management Area Daily Inspection Data Sheet	Daily Inspection	10/01/2007	04/22/2013	No
5	Weekly Surveillance Log, <90-day Storage Areas and Satellite Accumulation Areas	Weekly Inspection	06/07/1991	12/20/1999	No
6	Treatment Facility Waste Management Weekly Inspection Log Sheet Treatment Facility Waste Management Area Daily Inspection Log Sheet Treatment Facility Waste Management Area Weekly Inspection Data Sheet Treatment Facility Waste Management Area Daily Inspection Data Sheet Weekly Waste Area Surveillance T Plant Daily Waste Management Area Inspection Data Sheet	Weekly and Daily Dangerous Waste Inspections	01/2000 01/2005	12/2002 12/2007	No
7	Waste Management Area Daily Inspection Report Weekly Waste Area Surveillance	Weekly and Daily Inspections	1/2003	12/2004	Yes*
8	T Plant Weekly Waste Management Area Inspection Data Sheet	Weekly Inspection	10/18/2007	06/12/2013	No

* A container of Insulkote was leaking. Product was determined to be non-regulated material.

Table H-B-3. Waste Container Data

Container ID	Facility Identification	Waste Package Type	Total Volume (m^3)	Waste Type	Beginning Storage Date	Ending Storage Date	Assigned Waste Codes
0006038	277-T	Box	27	MLLW/TSCA-PCB	December 2002	September 2003	D004 through D011, F001 through F005

MLLW = mixed low-level waste
PCB = polychlorinated biphenyl
TSCA = *Toxic Substances Control Act of 1976*

H-B3.4 Unit Components, Parts, and Ancillary Equipment

The 277-T Building does not have any component, parts, or ancillary equipment.[BD32][LS(33][BD34] Once closure activities begin, all equipment and material will be removed from ~~or relocated within~~ the 277-T Building as necessary to support the sampling activities.

H-B3.5 Inspection of Units Before Decontamination

Decontamination activities are not anticipated for the 277-T Building; however, to prevent threats to human health and the environment during the closure period, the 277-T building will be inspected in accordance with WAC 173-303-320(2), "General Inspection." Inspections of the 277-T Building will be performed annually, until the clean-closure certification is approved[BD35][LS(36] by Ecology, and will verify the following:

- Posted warning signs at each entrance to the T Plant Complex are present, legible, and visible at 7.6 m (25 ft).
- No evidence of unusual conditions exists at the closing DWMU site.

H-B3.6 Decontamination [BD37][LS(38][BD39]

Decontamination activities are not anticipated for the 277-T Building. As specified in Ecology Publication 94-111, Section 5.3, *"Decontaminating Debris,"* and Section 5.6, *"Decontamination of Concrete Containment Structures,"* if sampling and analysis results indicated contamination above clean-closure performance standards, then the identified sampling areas will be decontaminated. Decontamination will be performed using the debris-specific, technology-based Alternative Treatment Standard for Hazardous Debris specified in 40 CFR 268.45 Table 1 (incorporated by reference at WAC 173-303-140(2)(a)) and meet the debris-specific performance standards specified therein.[BD40][LS(41]

The areas of contamination will be physically extracted to a minimum depth of 0.6 cm (0.25 in.) of the surface layer. Physical extraction techniques will include one of the following methods as defined in Table 1 of 40 CFR 268.45, "Alternative Treatment Standards for Hazardous Debris":

- Abrasive Blasting
- Scarification, Grinding, and Planing
- Spalling

H-B3.7 Identifying and Managing Contaminated Environmental Media

The records review and visual inspection outlined in Section H-B3.3 did not identify any documented releases of MLLW or TSCA-PCB LLW or the presence of potentially contaminated environmental media. Contaminated environmental media removal is not anticipated.

Should clean-closure verification sampling result in removal of the 277-T Building concrete flooring down to the level of the underlying soil, then a potential for contaminated environmental media (soil) could exist.[BD42][LS(43] If contaminated environmental media (soil) is identified, the nature and extent of contamination will be evaluated. Contaminated soil will be removed using equipment capable of removing the quantity of material required to complete removal and clean close the DWMU. Following removal of contaminated soil, additional confirmatory sampling efforts will be conducted for in accordance with the approved closure plan SAP (see Section H-B3.10.1) to demonstrate clean-closure levels.

If contaminated soil removal is required, it will be managed as a newly generated waste stream in accordance with WAC 173-303-610(5). Contaminated soil generated during the closure period must be properly disposed. The contaminated soil will be a newly generated waste and must be handled in accordance with all applicable requirements of WAC 173-303-170, "Requirements for Generators of Dangerous Waste," through 173-303-230, "Special Conditions." The contaminated soil will be containerized, labeled, sampled for waste characterization, designated as a dangerous or nondangerous waste, stored, and transported offsite where it will be treated (if necessary) to meet LDRs in 40 CFR 268, "Land Disposal Restrictions," incorporated into WAC 173-303-140(2)(a), "Land Disposal Restrictions," by reference, then ultimately disposed of in an appropriate waste disposal facility.

H-B3.8 Identifying and Managing Waste Generated During Closure

If concrete removal is required for decontamination (Section H-B3.6), the resulting material will be managed as a newly generated waste stream in accordance with WAC 173-303-610(5). Waste generated during the closure period must be properly disposed. The newly generated waste must be handled in accordance with all applicable requirements of WAC 173-303-170, "Requirements for Generators of Dangerous Waste," through 173-303-230, "Special Conditions." The concrete will be containerized, labeled, sampled for waste characterization, designated as a dangerous or nondangerous waste, stored, and transported offsite where it will be treated (if necessary) to meet LDRs in 40 CFR 268, "Land Disposal Restrictions," incorporated into WAC 173-303-140(2)(a), "Land Disposal Restrictions," by reference, then ultimately disposed of in an appropriate waste disposal facility.

H-B3.9 Confirming Clean-closure

The 277-T Building will be clean closed. A review of applicable RCRA operating record documents was completed to determine the release history of the area. Records verification included facility operating record/logbooks and weekly unit inspections, as outlined in Section ~~I3~~H-B3.3 of this closure plan. In addition to records verification, a visual inspection of the visible areas of the floor was performed to identify any dangerous waste-related staining, low points, cracks or other breaches of the storage area flooring. The visual inspections were completed on September 18, 2013 and June 15, 2015, and records reviews were completed and are documented in Attachment H-B.b. All MLLW and TSCA-PCB LLW waste has been previously removed, and there have been no documented spills or releases of MLLW and TSCA-PCB LLW. Post-closure escape of MLLW, TSCA-PCB LLW, and any associated constituents, leachate, contaminated run-off, and dangerous waste decomposition products to the ground, surface water, groundwater, or air is not anticipated.

The 277-T Building is adjacent to the T Plant Canyon. Sampling of the 277-T Building floor will be conducted to confirm that unrestricted use cleanup standards (MTCA [WAC 173-340] Method B) have been achieved. If sample results indicated contamination above clean-closure levels, contaminated concrete will be ~~removed~~[BD44][LS(45)][BD46] ~~and managed~~decontaminated ~~in accordance with Section H-B3.7~~. Once analytical results confirm clean-closure levels of target analytes, a determination will be made to leave the 277-T Building in place.

H-B3.10 Sampling and Analysis and Constituents to Be Analyzed

The SAP summarizes the sampling design used and associated assumptions based on the knowledge of 277-T Building. The sampling design includes input parameters used to determine the number and location of samples.

H-B3.10.1 Sampling and Analysis Plan

Sampling and analysis of the 277-T Building concrete floor will be conducted to confirm that clean-closure levels have been achieved. All sampling and analysis will be performed in accordance with the sampling and quality standards established in this closure SAP. The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the ASTM International, formerly the American Society for Testing and Materials (ASTM), *Annual Book of ASTM Standards*; and applicable EPA guidance. Sampling and analysis activities will meet applicable requirements of SW-846, ASTM standards, EPA-approved methods, and DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD), at the time of closure. This SAP was also developed using Ecology Publication 94-111, Section 7.0, "Sampling and Analysis for Clean Closure," and EPA/240/R-02/005.

H-B3.10.2 Target Analytes

Waste management records for the MLLW and TSCA-PCB LLW container previously stored at 277-T Building were reviewed. The waste management records identified the federal and state waste codes required for disposal of MLLW and TSCA-PCB LLW. The identified waste codes were the basis for the list of target analytes for analysis in this SAP. Table H-B-4 details the waste codes listed for the 277-T Building waste containers and the target analyte associated with each waste code.

Table H-B-4. Target Analyte List

Target Analyte (Waste Code)	CAS Number	Target Analyte (Waste Code)	CAS Number
Arsenic (D004)	7440-38-2	N-butyl alcohol (F003)	71-36-3
Barium (D005)	7440-39-3	Cyclohexanone (F003)	108-94-1
Cadmium (D006)	7440-43-9	Ethyl Acetate (F003)	141-78-6
Chromium (Hexavalent) (D007)	18540-29-9	Ethyl Benzene (F003)	100-41-4
Lead (D008)	7439-92-1	Ethyl Ether (F003)	60-29-7
Mercury (D009)	7439-97-6	Methanol (F003))	67-56-1
Selenium (D010)	7782-49-2	Methyl Isobutyl Ketone (F003)	108-10-1
Silver (D011)	7440-22-4	Xylene (F003) (U239)	1330-20-7
Carbon Tetrachloride (F001) (F002)	56-23-5	*o*-Cresol (F004)	95-48-7
Trichloroethylene (F001) (F002)	79-01-6	Benzene, nitro (F004)	98-95-3
1,1,1-Trichloroethane (F001) (F002)	71-55-6	Benzene (F005)	71-43-1
Methylene Chloride (F001) (F002)	75-09-2	Pyridine (F005)	110-86-1
Tetrachloroethylene (F001) (F002)	127-18-4	2-Nitropropane (F005)	79-46-9
Chlorobenzene (F002)	108-90-7	Carbon Disulfide (F005)	75-15-0
Ortho-dichlorobenzene (F002)	95-50-1	Isobutanol (F005)	78-83-1
1,1,2-Trichloroethane (F002)	79-00-5	2-Ethoxyethanol (F005)	110-80-5

Table H-B-4. Target Analyte List

Target Analyte (Waste Code)	CAS Number	Target Analyte (Waste Code)	CAS Number
Chlorinated Fluorocarbons (F001) (F002) (1,1,2-Trichloro-1,2,2-trifluoroethane (F002))	76-13-1	Toluene (F005)	108-88-3
Acetone (F003)	67-64-1	Methyl Ethyl Ketone (F005)	78-93-3
		PCBs (Aroclors)	N/A

CAS = Chemical Abstracts Service
N/A = not applicable
PCB = polychlorinated biphenyl

H-B3.10.3 277-T Building SAP Schedule

Confirmation closure sampling and analysis will be performed in accordance with the closure plan schedule in Section H-B4.

H-B3.10.4 277-T Building Project Management

The Permittees are responsible for planning, coordinating, sampling, preparing, packaging, and shipping samples to the laboratory.

H-B3.10.5 Sampling Design

The primary purpose of sampling the 277-T Building is to determine if analytical data values exceed the MTCA (WAC 173-340) Method B clean closure performance standards.

This SAP utilized Ecology Publication 94-111, Section 7.0, "Sampling and Analysis for Clean Closure," to determine the type of sampling design that will be utilized to demonstrate clean-closure. When designing the sampling plan, both focused and area wide (grid) sampling methods were considered. Ecology Publication 94-111, Section 7.2.1, identifies that area wide sampling is appropriate when the spatial distribution of contamination at or from the closure unit is uncertain. Ecology Publication 94-111, Section 7.3, "Sampling to Determine or Confirm Clean Closure," identifies the area wide sampling approach as generally appropriate for sampling to determine or confirm that clean-closure levels are achieved. Focused sampling, as identified in Section 7.2.2 of Ecology Publication 94-111, is selective sampling of areas where contamination is expected or releases have been documented. Based on the records review and visual inspection performed for the 277-T Building (Section H-B3.3), there is no known contamination within the sampling area and no documented releases; therefore, the area wide sampling approach was determined to be appropriate for 277-T Building. In addition to the area-wide sampling approach, a focused sampling approach was also included for low points, seams, cracks, crevices, and the sump. Area wide grid sampling and focused sampling are further defined in the following paragraphs.

Area Wide (Grid) Sampling. In grid sampling, samples are collected at regularly spaced intervals over space or time. An initial location or time is chosen at random, and the remaining sampling locations are defined so that locations are at regular intervals over an area (grid). Grid sampling is used to search for hot spots and infer means, percentiles, or other parameters. It is useful for estimating spatial patterns or trends over time. This design provides a practical method for designating sample locations and ensures uniform coverage of a site, unit, or process.

Judgmental (Focused) Sampling. In focused sampling, the selection of sampling units (i.e., the number and location and/or timing of collecting samples) is based on knowledge of the feature or condition under investigation and on professional judgment. Focused sampling is distinguished from probability-based sampling in that inferences are based on professional judgment, not statistical scientific theory. Therefore, conclusions about the target population are limited and depend entirely on the validity and accuracy of professional judgment. Probabilistic statements about parameters are not possible.

The quantity and location of area wide samples were determined utilizing the Visual Sampling Plan (VSP) software. VSP is a tool used throughout Washington State and nationally that statistically determines the quantity of samples required to accept or reject the null hypothesis based on input parameters specific to the 277-T Building.

For area wide grid sampling determination in VSP, both parametric and nonparametric equations rely on assumptions about the data population. Typically, however, nonparametric equations require fewer assumptions and allow for more uncertainty about the distribution of data. Alternatively, if parametric assumptions are valid, the required number of samples is usually less than if a nonparametric equation was used. For the 277-T Building, data assumptions were largely based on information obtained from a grouping of similar waste sites with the same type of constituents. Parameters from the 200-MG-1 waste sites were approved by Ecology in the SAP (DOE/RL-2009-60, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*), evaluated, deemed appropriate, and utilized for the input parameters for the 277-T Building. VSP parameter inputs and the basis for those inputs are detailed in Table H-B-5.

The decision rule for demonstrating compliance with the MTCA (WAC 173-340) Method B clean-closure level for area wide grid sampling has three parts:

- The 95 percent upper confidence limit on the true data mean must be less than the MTCA (WAC 173-340) Method B clean-closure level.
- No sample concentration can be more than twice the cleanup level.
- Less than 10 percent of the samples can exceed the cleanup level.

Using a nonparametric test and the input parameters identified in Table H-B-5, VSP calculated that a minimum of 20 samples is required to reject the null hypotheses with 95 percent confidence and ensure that the 277-T Building would not be mistakenly released as clean. For the purpose of utilizing VSP software, the null hypothesis is to compare a site mean to a fixed threshold. Data will be evaluated to ensure that less than 10 percent of the individual values exceed MTCA (WAC 173-340) Method B clean-closure performance standards and that no values are more than twice the cleanup level.

Focused sampling is considered biased sampling and therefore cannot be statistically demonstrated to meet the MTCA B closure performance standards. The decision criteria for the focused sampling results will be a direct comparison to ensure individual values do not exceed the MTCA Method B clean-closure performance standards.

Table H-B-5. Visual Sampling Plan Parameter Inputs

Parameter	Value	Basis
Primary Objective of the Sampling Design	Compare a site mean or median to a fixed threshold	Reject the null hypothesis.
Type of Sampling Design	Nonparametric	Data are not assumed to be normally distributed.
Working Null Hypothesis	The mean value at the site exceeds the threshold (WAC 173-340 "Model Toxics Control Act—Cleanup," Method B closure performance standards)	The null hypothesis assumes that the site is dirty requiring the sampling and analysis to demonstrate through statistical analysis that the site is clean.
Area Wide Grid Sampling Pattern	Triangular	A triangular pattern provided an even distribution of sample locations over the 277-T Building dangerous waste management unit.
Standard Deviation (S)	0.45	This is the assumed standard deviation value relative to a unit action level for the sampling area. The value of 0.45 is conservative, based on consideration of past verification sampling. MARSSIM suggests 0.30 as a starting point; however, 0.45 has been selected to be more conservative. (Number of samples calculated increases with higher standard deviation values relative to a unit action level.)
Delta (Δ)	0.40	This is the width of the gray region. It is a user-defined value relative to a unit action level. The value of 0.40 balances unnecessary remediation cost with sampling cost.
Alpha (α)	5%	This is the acceptable error of deciding a dirty site is clean when the true mean is equal to the action level. It is a maximum error rate since dirty sites with a true mean above the action level will be easier to detect. A value of 5% was chosen as a practical balance between health risks and sampling cost.
Beta (β)	20%	This is the acceptable error of deciding a clean site is dirty when the true mean is at the lower bound of the gray region. A value of 20% was chosen during the data quality objectives process as a practical balance between unnecessary remediation cost and sampling cost.
MARSSIM sampling overage	20%	MARSSIM suggests that the number of samples should be increased by at least 20% to account for missing or unusable data and uncertainty in the calculated value of *n*.

Source: EPA 402-R-97-016, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).*

Area-wide grid sample locations were determined using the area wide grid with a random start sampling method run in the VSP software. Statistical analysis of systematically collected data is valid if a random start to the grid is used. 277-T Building dimensions were entered into VSP to determine the locations of samples. The triangular grid sampling layout was determined to have an even distribution over the entire 277-T Building sampling area providing the most representative data set including coverage of the middle portion of the sampling area. The 20 samples will be taken from the node locations indicated by the VSP software (Attachment H-B.b) and will be assigned sample location identifications and sample numbers using the Hanford Environmental Information System (HEIS). The northwest corner of the 277-T Building DWMU is considered the (0,0) point of the sampling location map in Appendix B.

The first node location was chosen at random by the VSP software, and the subsequent 19 sample locations were assigned by the VSP software using a triangular grid sampling layout. Supporting documentation and the sampling grid map automatically generated by the VSP software are documented in Attachment H-B.b.

The records review and visual inspections did not identify any staining or cracks in the flooring and there have been no documented releases of dangerous waste. As a conservative approach, focused sampling will be performed on the low points and seams in the floor, along with the low point in the sump. The location of focused samples were determined by comparing the low points and seams in the floor of the 277-T Building with the existing location of the VSP area wide sampling locations. If an area wide grid sampling location was identified in close proximity to a low point or seam, then an additional focused sample of that area was not deemed necessary. Six focused samples were identified for the low points and seams not already covered by area wide grid sampling locations. Focused sampling locations are identified in Figure H-B-4.

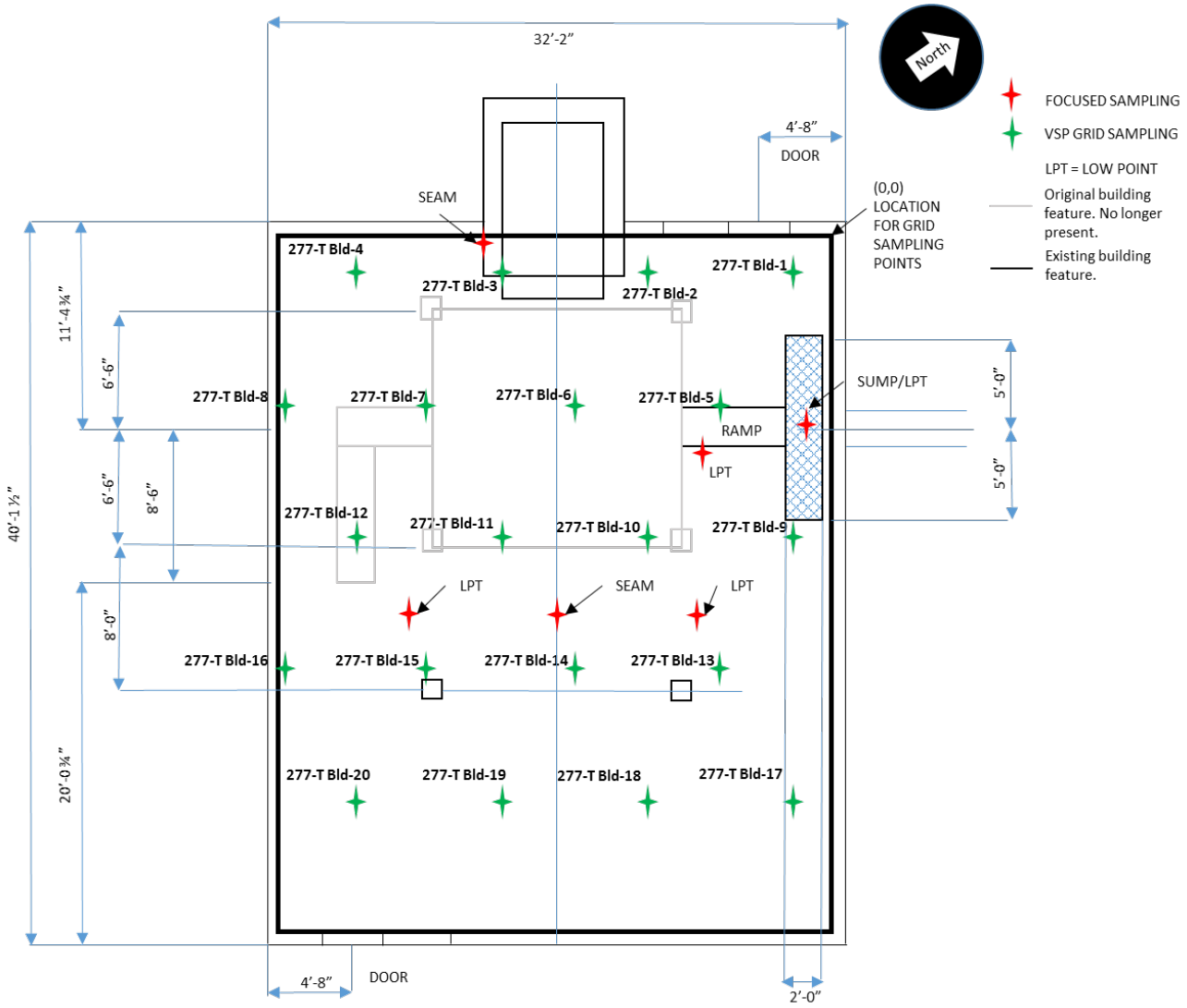

Figure H-B-4. Sample Locations for 277-T Building

H-B3.10.6 Sampling Methods and Handling

Grab sample matrix will consist of concrete collected in precleaned sample containers taken at a depth of 0 to ~~15.24 cm (0 to 6 in.)~~2.5 cm from the surface.[BD47][LS(48] For the purpose of this SAP, surface is defined as the exposed surface layer of the concrete flooring. Subsurface sampling was evaluated; however, based on results of the records review, free liquid waste was not stored in the 277-T Building, no releases of dangerous waste were identified, so subsurface sampling was not deemed necessary.

Grab samples will be collected into containers at the chosen node sample locations. To ensure sample and data usability, sampling will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling.[BD49][LS(50][BD51]

Sample container, preservation, and holding time requirements are specified in Table H-B-6 for concrete samples. These requirements are in accordance with the analytical method specified. The final container type and volumes will be identified on the sampling authorization form and the chain-of-custody form.

Table H-B-6. Sample Preservation, Container, and Holding Time for Concrete Samples

Method	Analysis/Analytes	Preservation Requirement	Holding Time	Bottle Type	Minimum Sample Size
EPA 6010	Metals	Cool ~4°C	6 months	G/P	20 g
EPA 7196	Chromium (Hexavalent)	Cool ~4°C	24 hours	G/P	20 g
EPA 7471	Mercury by Cold Vapor Atomic Absorption	None	28 days	G/P	15 g
EPA 8082	Polychlorinated Biphenyl	None	1 year	Amber Glass	250 g
EPA 8260	Volatile Organic Analytes	Cool ~4°C	14 days	G	5 × 40 g
EPA 8270	Semivolatile Organic Compounds	Cool ~4°C	14/40 days	Amber Glass	250 g
EPA 300.0*	Anions	Cool ~4°C	48 hours/28 days	G/P	120 g
EPA 9056A*	Anions	None	48 hours/28 days	G/P	250 g
EPA 200.8	Metals by Inductively Coupled Plasma-Mass Spectrometry	None	6 months	G/P	10 g

* Method 300.0 is for analysis of aqueous solutions, and method 9056A is for analysis of sample extractions from a solid (e.g., soils).

Note: For EPA Method 300.0, see EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes.* For four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B.*

48 hours/28 days = 48 hours for nitrate, nitrite, and phosphate; others, 28 days
EPA = U.S. Environmental Protection Agency
G/P = glass/plastic

To prevent potential contamination of samples, care will be taken to use decontaminated equipment for each sampling activity.

Level I EPA precleaned sample containers will be used for samples collected for chemical analysis. Container sizes may vary depending on laboratory specific volumes/requirements for meeting analytical detection limits.

The sample location, depth, and corresponding HEIS numbers will be documented in the sampler's field logbook. A custody seal (e.g., evidence tape) will be affixed to each sample container and/or sample collection package in such a way as to indicate potential tampering.

Each sample container will be labeled with the following information on firmly affixed, water resistant labels:

- Sampling Authorization Form and form number
- HEIS number
- Sample collection date and time
- Sampler identification
- Analysis required

- Preservation method (if applicable)

Sample records must include the following information:

- Analysis required
- Sample location
- Matrix (e.g., water or concrete)

Sample custody will be maintained in accordance with existing Hanford Site protocols to ensure maintenance of sample integrity throughout the analytical process. Chain-of-custody protocols will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained.

All waste (including unexpected waste) generated by sampling activities will be containerized, labeled, characterized, designated as a dangerous or nondangerous waste, stored, and transported offsite where it will be treated (if necessary) to meet LDRs in 40 CFR 268 incorporated into WAC 173-303-140(2)(a) by reference, then ultimately disposed of in an approved waste disposal facility.

H-B3.10.7 Analytical Methods

All analyses and testing will be performed consistent with this closure plan, laboratory analytical procedures, and HASQARD (DOE/RL-96-68). The approved laboratory must achieve the lowest practical quantitation limits (PQLs) consistent with the selected analytical method to confirm clean-closure levels. If a target analyte is detected at or above the clean-closure level but less than the PQL of the analytical method, Ecology will be notified and alternatives will be discussed to demonstrate clean-closure levels.

Analytical methods and performance requirements associated with the target analytes are outlined in Table H-B-7.

H-B3.10.8 Quality Control

Quality control (QC) procedures must be followed in the field and laboratory to ensure that reliable data are obtained. Field QC samples will be collected to evaluate the potential for cross-contamination and provide information pertinent to field sampling variability. Field QC will include collection of the following samples:

- Full trip blank
- Field transfer blank
- Equipment rinsate blank
- Field duplicate
- Field split samples

Laboratory QC samples estimate the precision and bias of the analytical data. Field and laboratory QC samples are summarized in Table H-B-8.

A data quality assessment will be performed utilizing the guidance in EPA/240/B-06/084, *Data Quality Assessment: A Reviewer's Guide*, and implementing the specific requirements in Sections H-B3.10.8 through H-B3.10.10.

Data verification, data validation, and data quality assessment will include both the primary samples and quality control samples.[BD52][LS(53][BD54]

Table H-B-7. Concrete Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard (mg/kg)		Practical Quantitation Limit[d] (mg/kg)	Accuracy Req't (% Recovery)[c]	Precision Req't (Relative Percent Difference)[c]
			Carcinogen	Noncarcinogen			
7440-38-2	Arsenic[a]	SW-846 Method 6010	0.667	24	10[BD55][LS(56][BD57]	±30	≤30
7440-39-3	Barium[a]	SW-846 Method 6010	N/A	16,000	2.0	±30	≤30
7440-43-9	Cadmium[a]	SW-846 Method 6010	N/A[BD58][LS(59][BD60]	80	0.5	±30	≤30
18540-29-9	Chromium (Hexavalent)[a]	SW-846 Method 7196	N/A[BD61][LS(62][BD63]	240	1.0	±30	≤30
7439-92-1	Lead[b]	SW-846 Method 6010	N/A	250	5.0	±30	≤30
7439-97-6	Mercury[b]	SW-846 Method 7471 or 200.8	N/A	2	0.2	±30	≤30
7440-22-4	Silver[a]	SW-846 Method 6010	N/A	400	1.0	±30	≤30
71-43-2	Benzene[a]	SW-846 Method 8260	18.2	320	0.005	±30	≤30

Table H-B-7. Concrete Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard (mg/kg)		Practical Quantitation Limit[d] (mg/kg)	Accuracy Req't (% Recovery)[c]	Precision Req't (Relative Percent Difference)[c]
			Carcinogen	Noncarcinogen			
56-23-5	Carbon Tetrachloride[a]	SW-846 Method 8260	14.3	320	0.005	±30	≤30
95-48-7	*o*-cresol[a]	SW-846 Method 8270	N/A	4,000	0.33	±30	≤30
78-93-3	Methyl Ethyl Ketone (2- Butanone)[a]	SW-846 Method 8260	N/A	48,000	0.01	±30	≤30
98-95-3	Benzene, Nitro[a]	SW-846 Method 8270	N/A	160	0.33	±30	≤30
110-86-1	Pyridine[a]	SW-846 Method 8260	N/A	80	0.005	±30	≤30
79-01-6	Trichloroethylene[a]	SW-846 Method 8260	12	40	0.005	±30	≤30
71-55-6	1,1,1-Trichloroethane[a]	SW-846 Method 8260	N/A	160,000	0.005	±30	≤30
76-13-1	Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane)[a]	SW-846 Method 8260	N/A	2,400,000[BD64][LS(65][BD66]	0.01	±30	≤30

Table H-B-7. Concrete Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard (mg/kg)		Practical Quantitation Limit[d] (mg/kg)	Accuracy Req't (% Recovery)[c]	Precision Req't (Relative Percent Difference)[c]
			Carcinogen	Noncarcinogen			
75-09-2	Methylene Chloride[a]	SW-846 Method 8260	500	~~4,800~~480	0.005	±30	≤30
127-18-4	Tetrachloroethylene[a]	SW-846 Method 8260	476	480	0.005	±30	≤30
108-90-7	Chlorobenzene[a]	SW-846 Method 8260	N/A	1,600	0.005	±30	≤30
95-50-1	Ortho-dichlorobenzene[a]	SW-846 Method 8270	N/A	7,200	0.33	±30	≤30
79-00-5	1,1,2-trichloroethane[a]	SW-846 Method 8260	17.5	320	0.005	±30	≤30
67-64-1	Acetone[a]	SW-846 Method 8260	N/A	72,000	0.02	±30	≤30
71-36-3	N-butyl alcohol (I-Butanol)[a]	SW-846 Method 8260	N/A	8,000	0.1	±30	≤30
108-94-1	Cyclohexanone[a]	SW-846 Method 8270	N/A	400,000	200	±30	≤30
141-78-6	Ethyl Acetate[a]	SW-846 Method 8015	N/A	72,000	5.0	±30	≤30

Table H-B-7. Concrete Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard (mg/kg)		Practical Quantitation Limit[d] (mg/kg)	Accuracy Req't (% Recovery)[c]	Precision Req't (Relative Percent Difference)[c]
			Carcinogen	Noncarcinogen			
100-41-4	Ethyl Benzene[a]	SW-846 Method 8260	N/A	8,000	0.005	±30	≤30
60-29-7	Ethyl Ether[a]	SW-846 Method 8260	N/A	16,000	0.005	±30	≤30
67-56-1	Methanol[a]	SW-846 Method 8260	N/A	160,000	1.0	±30	≤30
108-10-1	Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)[a]	SW-846 Method 8260	N/A	6,400	0.01	±30	≤30
108-38-3	*m*-Xylene[a, e]	SW-846 Method 8260	N/A	16,000	0.005	±30	≤30
95-47-6	*o*-Xylene[a, e]	SW-846 Method 8260	N/A	16,000	0.005	±30	≤30
106-42-3	*p*-Xylene[a, e]	SW-846 Method 8260	N/A	16,000	0.005	±30	≤30
79-46-9	2-Nitropropane[f]	SW-846 Method 8260	N/A	N/A	1	±30	≤30
75-15-0	Carbon Disulfide[a]	SW-846 Method 8260	N/A	8,000	0.005	±30	≤30

Table H-B-7. Concrete Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard (mg/kg)		Practical Quantitation Limit[d] (mg/kg)	Accuracy Req't (% Recovery)[c]	Precision Req't (Relative Percent Difference)[c]
			Carcinogen	Noncarcinogen			
78-83-1	Isobutanol[a]	SW-846 Method 8260	N/A	24,000	0.5	±30	≤30
110-80-5	2-Ethoxyethanol[a]	SW-846 Method 8270	N/A	~~72,000~~7,200	200	±30	≤30
108-88-3	Toluene[a]	SW-846 Method 8260	N/A	6,400	0.005	±30	≤30
1336-36-3	Polychlorinated Biphenyl[a]	SW-846 Method 8082	0.5	N/A	0.16	±30	≤30

Source: SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B.*

Note: Due to the quantity and nature of the waste stored in the 277-T Building not presenting a threat to groundwater, and not having soil or the presence of plants within the building, no groundwater or ecological indicator cleanup standards (WAC 173-340-747, "Deriving Soil Concentrations for Groundwater Protection," and WAC 173-340-7490, "Terrestrial Ecological Evaluation Procedures," through WAC 173-340-7494, "Priority Contaminants of Ecological Concern") are addressed.

a. Closure performance standards are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to WAC 173-340, "Model Toxics Control Act—Cleanup," regulations, WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards,"Method B (unrestricted use standards). Where both carcinogen and a noncarcinogen performance standards are available, the lowest value will be used.

b. Closure performance standards are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to WAC 173-340, "Model Toxics Control Act—Cleanup," regulations, WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards," Method A (unrestricted use standards). MTCA A values were used when MTCA B values were not available.

c. Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples is also performed. Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analyses.

d. For these analytical performance requirements, the required detection limit and practical quantitation limit are identical.

e. *m*-Xylene, *o*-Xylene, and *p*-xylene will be analyzed as total xylene.

f. The closure performance standard for 2-nitropropane was removed in the May 2014 CLARC table updates. This analyte will not be analyzed for due to the unavailability of a closure performance standard.

N/A = not applicable

Table H-B-8. Project Quality Control Sampling Summary[BD67][LS(68][BD69]

Quality Control Sample Type	Frequency	Characteristics Evaluated
Field Quality Control		
Full Trip Blanks	One per 20 samples per media sampled.	Contamination from containers or transportation
Equipment Rinsate Blanks	As needed. If only disposable equipment is used, then an equipment blank is not required. Otherwise, one per 20 samples per media[a].	Adequacy of sampling equipment decontamination and contamination from nondedicated equipment
Field Duplicates	One per batch[g], 20 samples maximum of each media sampled (concrete samples).	Precision, including sampling and analytical variability
Field Split Samples	As needed.[h] When needed, the minimum is one per analytical method, per media sampled, for analyses performed where detection limit and precision and accuracy criteria have been defined in the Performance Requirements tables.	Precision, including sampling, analytical, and interlaboratory
Laboratory Quality Control[b]		
Method Blanks	1 per batch[g]	Laboratory contamination
Lab Duplicates	[c]	Laboratory reproducibility and precision
Matrix Spikes	[c]	Matrix effect/laboratory accuracy
Matrix Spike Duplicates	[c]	Laboratory reproducibility, accuracy, and precision
Surrogates	[c]	Recovery/yield
Tracers	[c]	Recovery/yield
Laboratory Control Samples	1 per batch[g]	Evaluate laboratory accuracy
Performance Evaluation Programs[c]	Annual	Evaluate laboratory accuracy
Double-Blind Standards	Quarterly[d]	Evaluate laboratory accuracy
Audit/Assessment	Annually[e] or every 3 years[f]	Evaluate overall laboratory performance and operations

Table H-B-8. Project Quality Control Sampling Summary[BD67][LS(68][BD69]

Quality Control Sample Type	Frequency	Characteristics Evaluated

a. Whenever a new type of nondedicated equipment is used, an equipment blank shall be collected every time sampling occurs until it can be shown that less frequent collection of equipment blanks is adequate to monitor the decontamination procedure for the non-dedicated equipment.

b. As defined in the laboratory contract or quality assurance plan and/or analysis procedures.

c. Nationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.

d. Concrete matrix double-blind standards are submitted by request of Analytical Services.

e. DOE Quality Systems for Analytical Services requires annual audit of commercial laboratories.

f. DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD), does not define a frequency for assessment of onsite laboratories. Three year evaluated supplier list requirement is typically applied.

g. Batching across projects is allowing for similar matrices.

h. Field split samples are used to compare inter-laboratory comparison of samples. Field split samples are not required when only one laboratory is used for sample matrix or analyte.

DOE = U.S. Department of Energy

H-B3.10.9Data Verification

Analytical results will be received from the laboratory, loaded into a database (e.g., HEIS), and verified. Verification activities include, but are not limited to, the following:

- Amount of data requested matches the amount of data received (number of samples for requested methods of analytes)
- Procedures/methods are used.
- Documentation/deliverables are complete.
- Hard copy and electronic versions of the data are identical.
- Data seem reasonable based on analytical methodologies.[BD70][LS(71]

H-B3.10.10 Data Validation

Data validation is performed by a third party. The laboratory supplies contract laboratory program equivalent analytical data packages intended to support data validation by the third party. The laboratory submits data packages that are supported by QC test results and raw data.

Controls are in place to preserve the data sent to the validators and allow only additions to be made, not changes to the raw data.

The format and requirements for data validation activities are based upon the most current version of USEPA-540-R-08-01, *National Functional Guidelines for Superfund Organic Methods Data Review* (OSWER 9240.1-48), and USEPA-540-R-10-011, *National Functional Guidelines for Inorganic Superfund Data Review* (OSWER 9240.1-51). As defined by the validation guidelines, 5 percent of the results will undergo Level C validation.

H-B3.10.11 Verification of VSP Input Parameters

Analytical data will be entered back into the VSP software. If all analytical data for a particular analyte are nondetect, verification of VSP input parameters is not required for that analyte. The VSP software uses the analytical data to determine if the user input parameters were estimated appropriately. Once analytical data are entered into the VSP software, VSP will calculate the true standard deviation and if the null hypothesis can be rejected. If the calculated standard deviation is smaller than the estimated user input standard deviation, no additional sampling will be required. If the calculated standard deviation is larger than the estimated standard deviation, additional sampling may be required. Comparison of the maximum data value for each analyte to the clean-closure standards will ensure that all individual analytes are below the action levels. Verification of the null hypothesis through VSP will determine if the mean value of the site analytical data supports rejection of the null hypothesis (Section H-B2.1). [BD72][LS(73][BD74]

H-B3.10.12 Documents and Records

The Project Manager is responsible for ensuring that the current version of the SAP is being used and providing any updates to field personnel. Version control is maintained by the administrative document control process. Changes to the SAP affecting the data needs will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b) to DOE and the lead regulatory agency.[BD75][LS(76]

Logbooks are required for field activities. A logbook must be identified with a unique project name and number. The individual(s) responsible for logbooks will be identified in the front of the logbook, and only authorized persons may make entries in logbooks. Logbooks will be signed by the field manager, supervisor, cognizant scientist/engineer, or other responsible individual. Logbooks will be permanently bound, waterproof, and ruled with sequentially numbered pages. Pages will not be removed from logbooks for any reason. Entries will be made in indelible ink. Corrections will be made by marking through the erroneous data with a single line, entering the correct data, and initialing and dating the changes.

The project manager is responsible for ensuring that a project file is properly maintained. The project file will contain the records or references to their storage locations. The following items will be included in the project file, as appropriate:

- Field logbooks or operational records
- Data forms
- Global positioning system data
- Chain-of-custody forms
- Sample receipt records
- Inspection or assessment reports and corrective action reports
- Interim progress reports
- Final reports
- Laboratory data packages
- Verification and validation reports

The laboratory is responsible for maintaining, and having available upon request, the following items:

- Analytical logbooks
- Raw data and QC sample records

- Standard reference material and/or proficiency test sample data
- Instrument calibration information

Records may be stored in either electronic or hard copy format. Documentation and records, regardless of medium or format, are controlled in accordance with internal work requirements and processes to ensure the accuracy and retrievability of stored records. Records required by the Tri-Party Agreement (Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*) will be managed in accordance with the requirements therein.

H-B3.10.13 Sampling and Analysis Requirements to Address Removal of Contaminated Concrete

In the event that sample results based on the MTCA Method B (WAC 173-340) three part test (Section H-B3.10.5) indicate contamination above clean-closure levels, the contaminated concrete will be removed in accordance with Section H-B3.6. Following removal of contaminated concrete, additional samples will be taken at the same grid location as identified in Attachment H-B.b. Additional focused sampling may be added in areas where contamination is identified. Additional focused samples will be documented, as required in Section H-B3.10.12, and provided with the closure certification upon request by Ecology. These samples will be analyzed in accordance with the methods specified in Table H-B-7, with accompanying QC samples as discussed in Section H-B3.10.8.

H-B3.10.14 Revisions to the Sampling and Analysis Plan and Constituents to Be Analyzed

If changes to the SAP are necessary due to unexpected events during closure that will affect sampling, a revision to this SAP will be submitted no later than 30 days after the unexpected event as a permit modification as required in WAC 173-303-610(3)(b)(iii) and WAC 173-303-830, “Permit Changes.”

H-B3.11 Role of the Independent Qualified Registered Professional Engineer

An independent, qualified, registered, professional engineer (IQRPE) will be retained to provide certification of the closure, as required by WAC 173-303-610(6). The IQRPE will be responsible for observing field activities and reviewing documents associated with closure of the 277-T Building. At a minimum, the following activities would be completed:

- Review 277-T Building visual inspections.
- Review sampling procedures and results.
- Observe and/or review sampling activities.
- Observe and/or review contaminated environmental debris removal (as applicable).
- Verify that locations of samples are as specified in the SAP.

The IQRPE will record his or her observations and reviews in a written report that will be retained in the operating record. The resulting report will be used to develop the clean-closure certification, which will then be provided to Ecology.

H-B3.12 Certification of Clean-closure

In accordance with WAC 173-303-610(6), within 60 days of completion of closure of the 277-T Building, a certification that the DWMU has been closed in accordance with the specifications in this closure plan will be submitted to Ecology by registered mail. The certification will be signed by the owner or operator and by an IQRPE.

Upon request by Ecology, the following information will be submitted to support the closure certification:

- All field notes and photographs related to closure activities
- A description of any minor deviations from the approved closure plan and justification for these deviations
- Documentation of the removal and final disposition of any unanticipated contaminated environmental media
- All laboratory and/or field data, including sampling procedures, sampling locations, QA/QC samples, and chain-of-custody procedures for all samples and measurements, including samples and measurements taken to determine background conditions and/or determine or confirm clean-closure
- A summary report that identifies and describes the data reviewed by the IQRPE and tabulates the analytical results of samples taken to determine and confirm clean-closure
- A description of the DWMU area appearance at completion of closure, including what parts of the former unit, if any, will remain after closure

H-B3.13 Conditions That Will Be Achieved When Closure Is Complete

Upon confirmation of clean closure levels through the sampling and analysis, the 277-T Building will remain in an “as-is” state, with the building remaining in place. The 277-T Building will continue to be used for equipment and material storage in support of the T Plant Complex OUG operations. A permit modification request will be submitted after clean-closure has been confirmed to remove the 277-T Building DWMU from the sitewide permit active DWMUs.

H-B4 Closure Schedule and Time Frame

Confirmation sampling and analysis activities will be completed no more than 180-days after approval of the permit modification incorporating this closure plan. Should unexpected circumstances arise and an extension to the 180-day closure activity expiration date be deemed necessary, a Class ‘1 permit modification request will be submitted to Ecology for approval at least 30-days prior to the 180-day expiration date in accordance with WAC 173-303-610(4)(c) and WAC 173-303-830, Appendix I. The extension request would also demonstrate that all steps to prevent threats to human health and the environment, including compliance with all applicable permit requirements and criteria in WAC 173-303-610(4)(b)(i) or (ii), have been and will be taken. Closure certification will be submitted to Ecology within 60 days following completion of closure activities at the 277-T Building as outlined in Section H-B3.12 (Table H-B-9 and Figure H-B-5).

H-B5 Closure Costs

A detailed written estimate outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status is not required per Permit Condition II.H.

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Table H-B-9. 277-T Building Closure Activity Description

Primary Activity	Secondary Activity	Expected Duration
Sampling of concrete for clean-closure levels	Not applicable	180 days
CLOSURE ACTIVITIES COMPLETE		
Transmit closure certification to Washington State Department of Ecology	Not applicable	60 days

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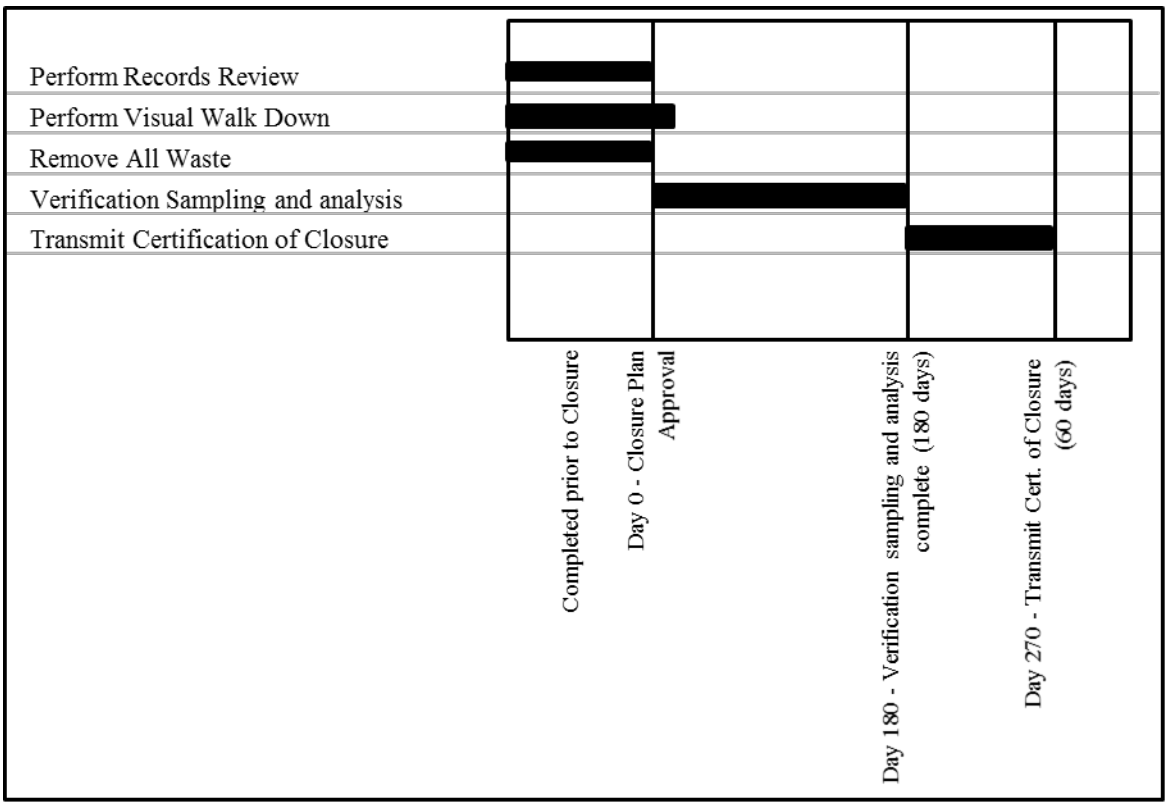

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5 Figure H-B-5. 277-T Building Closure Schedule Activities [BD77][LS(78)][BD79]

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Attachment H-B.a

T Plant 277-T Building RCRA Records Review and Facility Visual Inspection Supporting Documentation

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Attachment H-B.b

T Plant 277-T Building Visual Sampling Plan Supporting Documentation

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